

NOTE ON *CAMPANULARIA INTEGRA* AND *ORTHOPYXIS CALICULATA*.

By W. M. BALE.

[Read 29th August, 1934.]

The question of the identity or otherwise of *Campanularia integra* MacG. with *Orthopyxis caliculata* (Hincks) has been much debated, some competent observers maintaining that they are distinct species; others, equally competent, claim that they are only forms of one species, and that they occur abundantly together, even in the same colony, and with all intermediate gradations. In dealing with the Australian species, and in the absence of specimens of *C. integra*, I have treated *O. caliculata* as distinct, because my specimens agreed completely with Hincks' account of that species, but did not at all correspond with the descriptions of *C. integra*. Moreover, it is to be noted that while *O. caliculata* appears to be cosmopolitan, *C. integra* is a strictly northern form, which does not appear to have been recorded from the southern hemisphere at all, those hydroids which have been referred to the species from Patagonia, Chili, Natal, Australia, and New Zealand being in all cases admittedly *O. caliculata*, while none of the observers refer to any intermediate forms.

I have had the opportunity of examining typical specimens of *C. integra* (for which I have to thank Dr. Broch), and I find that the hydrothecae agree absolutely in form with those of *O. caliculata* (though differing greatly in size). That is to say, that they have precisely the characters of the genus *Orthopyxis*, a fact which I think observers have not noted. I pointed out in 1914 that *O. caliculata* was the type of a group of species distinguished by having the lower part of the hydrotheca laterally compressed, so that there are at this part two broader and two narrower sides, and the "floor" of the theca is elliptic; and further, that the perisarc of the narrower sides is thickened, sometimes slightly, often very considerably, even in the same species. From the compressed condition of the lower part of the thecae it naturally results that they present a very different appearance according to the aspect in which they are viewed; seen broadside they have a bell-shape, seen in the narrower aspect they are more funnel-shaped, and this difference is greatly accentuated when the thickening of the perisarc is pronounced. This, as I have previously noted, is the explanation of the descriptions by various observers of two different forms of thecae (with intermediate gradations) being found growing on the same hydrorhiza. Thus Hincks (1868, Plate xxxi, fig. 2b) shows two thecae of *O. caliculata* which he supposed to have been differently formed, but which really represent two aspects of the same theca. Other instances of the kind are *O. compressa* (Clarke), *O. everta* (Clarke), *O. crenata* (Hartlaub), *O. pacifica* Stechow, *Campanularia* (?) *intermedia* Stechow. The hydrothecae are therefore intermediate between those of the typical Campanularians and those of the genus *Silicularia*, in which the compressed condition is much more marked.

Northern observers recognize a "*C. integra* forma *caliculata*" which they consider identical with *O. caliculata*. It is said to differ from the type *C. integra* only in having the theca laterally compressed at the margin, and in having the perisarc thickened. The latter feature, however, is common to the type form, so that the elliptic margin is the sole distinction. It is immaterial; it may be expected that where the lower half of the theca is compressed the condition may sometimes extend to the margin. I have noted such instances in *O. macrogona*, and probably careful search would discover them in other species. While observers are unquestionably right in associating this form with the type, it is not apparent why they have associated it with *O. caliculata*, which has not been described as possessing and which does not possess, this character.

Although the hydrothecae of *O. caliculata* agree with those of *O. integra* in form, they are easily distinguished by their far smaller size. This character seems to have been generally overlooked, yet it is specially stressed by Hincks, who, after giving several figures "highly magnified", adds a much smaller figure "drawn to the author's scale, for comparison with other species". This figure shows the theca not much more than half the length of that of *C. integra*, with the other dimensions in the same proportion. I have measured a series of thecae of *O. integra*, which range between 0.65 and 0.82 mm. in length, most of them averaging about 0.72. A similar number of thecae of *O. caliculata* show extreme measurements of 0.33 and 0.50, with the majority averaging about 0.38. The relative proportions of the two species therefore agree fairly with the figures of Hincks.

While, however, the hydrothecae of the two species differ from each other only in size, it is quite otherwise with the gonangia, which are unlike in every particular. Those of *O. integra* differ from those of most species in not being compressed, so that a transverse section is circular. They are very long, and deeply furrowed in a continuous spiral throughout their length, the edges of the furrow being so sharply angular that they are sometimes described as carinated. (It has been pointed out, however, by Levinsen and other observers, that in many cases the furrow is much less pronounced, being only a slight spiral depression. Whether the difference is developmental, sexual or abnormal is not stated.) Fully developed specimens are mostly from 2.2 to 2.5 mm. in height, and so far as I have seen they have thin perisarc, almost colourless.

The gonothecae of *O. caliculata* differ from these so completely that I cannot suppose that any observer having the two species before him would think of uniting them. They are 1.2 to 1.25 mm. in length, slightly compressed, oblong or ovate when regularly formed, but in all the colonies which I have seen there are but few of regular form, the great majority being more or less distorted and irregular. Sometimes they have two slight inflations, corresponding to the two contained zooids, as shown by Hincks, or the position of the second zooid may be indicated by an awkward-looking angular prominence. Occasionally the sides exhibit a few scarcely noticeable undulations, but I have never seen any distinct annulations, nor any trace of spiral markings. In my account of the species I have given outlines of several individuals, which embrace some of the variations which I have met with. In the few fertile colonies which I have examined the gonothecae are numerous, equalling or surpassing in number the hydrothecae. They are fairly thick-walled and rather deeply coloured.

A most important character of the genus *Orthopyxis* is the structure of the hydranth, which has the hypostome formed in its lower half by the union of

the basal parts of the tentacles in a calyx, and in the distal half by a free dome-like extension of the edge of the calyx; a structure shown by Jickeli in a section of *O. caliculata*, and by Broch in *Bonneviella*. The hydranths of my specimens of *O. integra* are not in a condition to enable me to verify the structure, but presumably it agrees with that of *O. caliculata*. A hydranth fully retracted, seen from above, appears elliptical; this, however, is due merely to the form of the lower part of the hydrotheca, in which it is closely packed. In an empty theca, seen from above, the "floor" measured 0.25 mm. in the longer diameter by 0.20 in the narrower, and this seems to be about the usual proportion. Of course the proportionate diameter of the outside of the theca will vary according to the amount of perisarcal thickening of the narrower sides.

*O. caliculata* then is distinguished from *O. integra* forma *calyculata* by the far smaller hydrothecae and gonothecae, and by the totally different form of the latter. Not all the hydroids which have been referred to *O. caliculata* really belong to that species. A specimen assigned to it by Nutting is said to have the hydrothecae larger even than those of *O. integra*; this can hardly be a correct identification. *O. compressa* (Clarke), which is sometimes classed among the synonyms of *O. integra*, is easily distinguished by the smooth thick pedicels, which are never waved or twisted, even in the absence of the very distinct much flattened gonothecae, characters emphasized by Clarke, Nutting, Vanhoffen, and Linko. The "*O. caliculata*" of Calkins and Fraser is *O. pacifica* Stechow, a species with large hydrothecae and very distinctive female gonothecae, large (about 2.2 mm. in height and 1.2 in width), regular in form and widening up to the top, and sometimes faintly corrugated transversely. The few male gonothecae which I have seen were much shorter, and wider at the base. *O. crenata* (Hartlaub) and *O. everta* (Clarke) have large hydrothecae with crenate margins (often indistinct); the latter species is readily distinguished by the small oblong gonothecae.

The *Tubularia clytioides* of Lamouroux is classed by Nutting as an *Orthopyxis*, but its position in the genus is doubtful. All the known species have the pedicels formed like those either of *O. compressa* or *O. integra*, the former straight, smooth (though often with a few well-defined separate joints near the top); and the latter with more or less loosely disposed spiral undulations. The pedicels of *T. clytioides* are unlike either of these, having a series of distinct annulations at the top and bottom, or throughout, just like those of an *Obelia*.

Of the five Australian species which I have observed, *O. caliculata* agrees fully with Hincks' account. *O. macrogona* has the hydrothecae more compressed and wider at the base, and the band of thickened perisarc surrounding the upper half is distinctive. The gonothecae are like those of *O. caliculata*, and equally irregular in form, but are very much larger. The other three species have very similar hydrothecae. *O. angulata* differs from all the rest in having smooth pedicels like those of *O. compressa*. *O. platycarpa* has oblong compressed gonothecae, while those of *O. wilsoni* are large, sub-cylindrical, tapering at the base, not compressed, with a number of irregular longitudinal folds.

---